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EP 0451623 A1 US 4958382 A

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(54) Antenna incorporating a function selector in a radio communications device.

(57) In order to provide an ergonomically desirable switch for a radio communications device 10, a function selector 18, such as a rotary switch, is incorporated in an antenna 12 of the radio communications device 10. Selected movement of the antenna 12 causes relative movement in the function selector 18 and results in a change in an operating parameter, such a current operating channel for a transceiver 26 of the radio communications device 10 determined by a new position of the function selector 18.

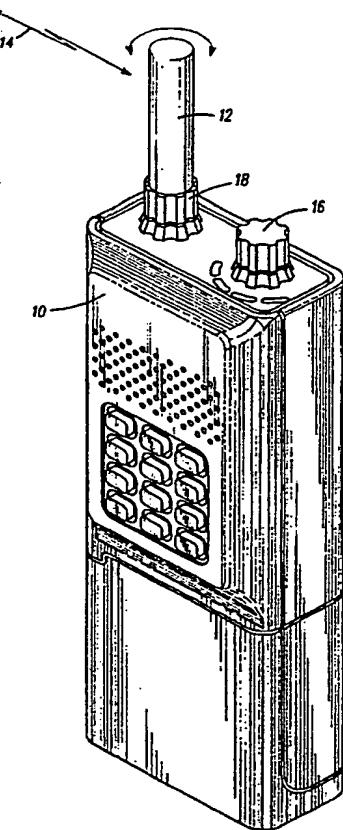


FIG. 1

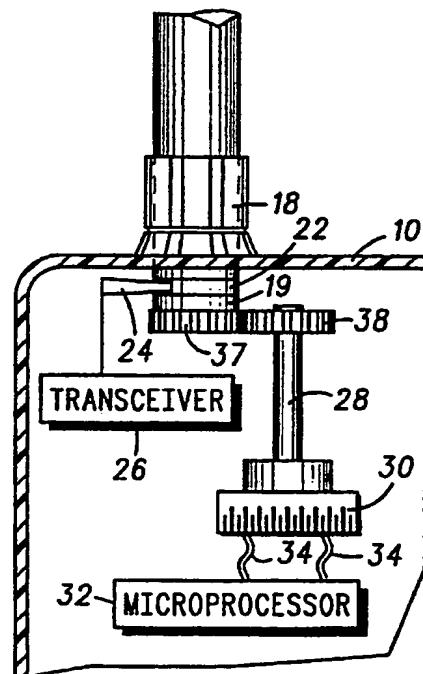


FIG. 3

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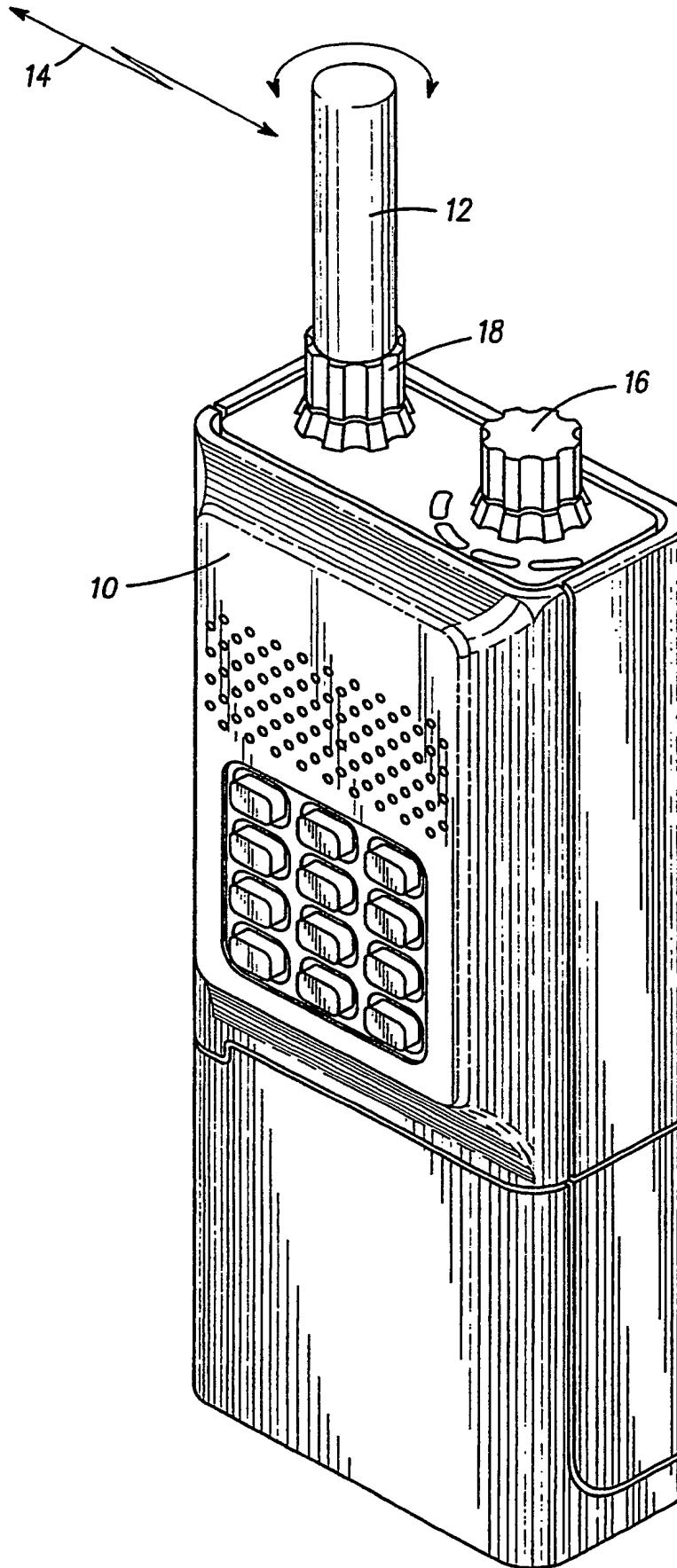


FIG. 1

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FIG. 2

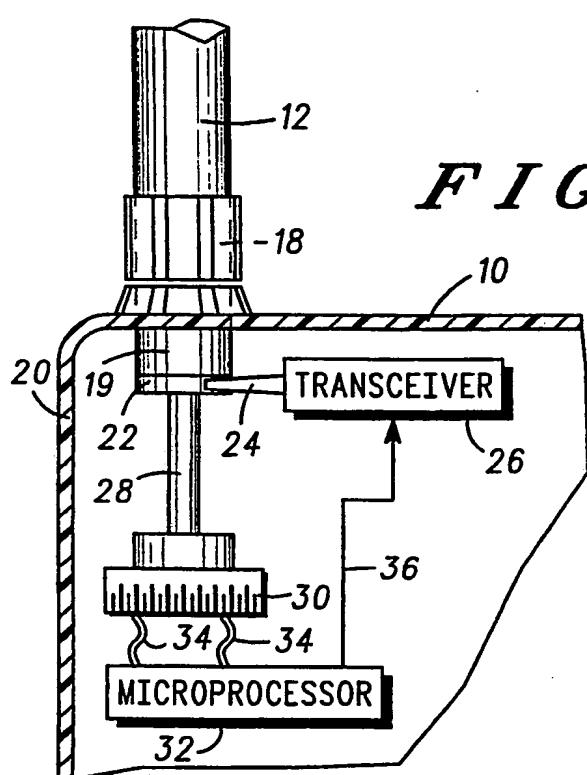


FIG. 3

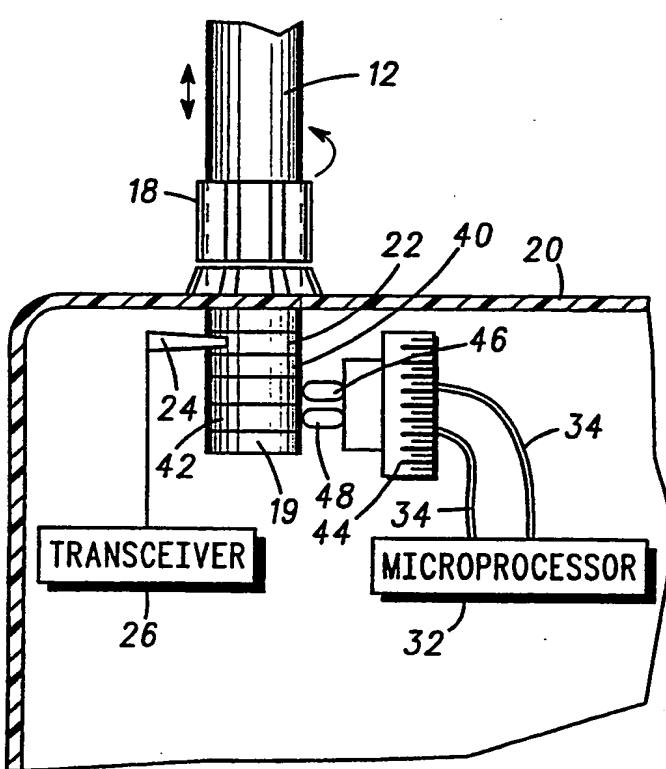
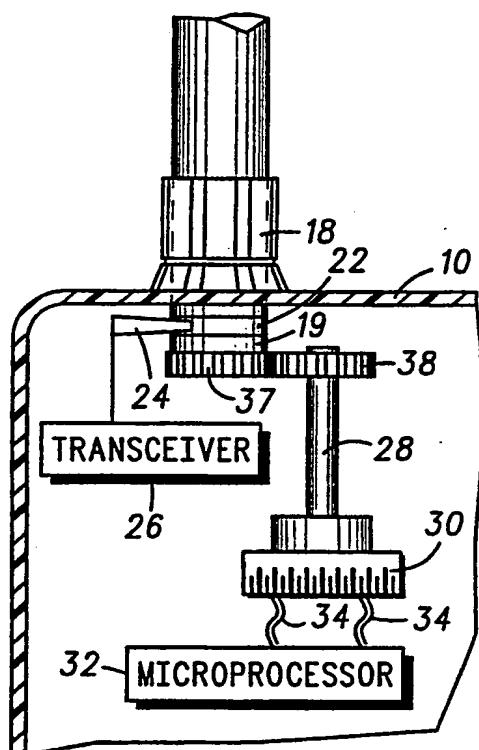


FIG. 4

A SELECTOR

Background to the Invention

5 This invention relates, in general, to selectors, such as switches, and is particularly, but not exclusively, applicable to selectors for use in portable radio communication devices.

Summary of the Prior Art

10 In the field of radio communications devices, it has been shown that users of the radio communications device ergonomically prefer the use of switches, and particularly rotary switches, to select particular functions, e.g. channel selection. With the continual trend towards miniaturisation of
15 radio communications devices, the provision of such switches is restricted because of their size. More particularly, the size of a rotary switch must be sufficient to allow a user of the communications device to freely rotate the rotary switch whilst encumbered with gloves, for example. In addition, the continuing trends to reduce the size of radios presents a reduction in
20 available space for such switches.

It will be appreciated that there is a requirement in the art to provide an ergonomic switch that is suitable for implementation in future generations of radio communications devices.

25 Summary of the Invention

In accordance with the present invention there is provided a selector for controlling an operating parameter of a radio communications device, the selector comprising: an antenna portion; and a function selector portion,
30 operatively coupled to the antenna portion, having a plurality of selectable operative positions; wherein selected movement of the antenna portion causes the function selector portion to move between an initial operative position and a new operative position with the result that the operating parameter of the radio communications device is changed.

35 In a preferred embodiment, the selector may be a rotary switch having a rotary movement, or a potentiometer. Alternatively, the selector is a pull-

up, push-down switch having longitudinal movement along an axis of the antenna portion.

If the selector is a potentiometer, the selector may further comprise a gearing mechanism for limiting rotary movement of the function selector portion.

The selector may be adapted to select an operating parameter that is reliant upon operation of the antenna portion.

Exemplary embodiments of the invention will now be described with reference to the accompanying drawings.

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Brief Description of the Drawings

Fig. 1, shows a radio communications device having a switch constructed in accordance with a preferred embodiment of the present invention.

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Fig. 2 illustrates the switch of Fig. 1 in greater detail.

Fig. 3 illustrates an alternative embodiment for the switch of Fig. 1.

Fig. 3 illustrates yet another alternative embodiment for the switch of Fig. 1.

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Detailed Description of a Preferred Embodiment

Fig. 1, shows a radio communications device 10, such as a Saber® radio manufactured by Motorola Inc., having a selector constructed in accordance with a preferred embodiment of the present invention. The radio communications device 10 has an antenna portion 12 for transmitting and/or receiving radio frequency signals 14. The radio communications device 10 further comprises a rotary switch 16 and a further selector portion 18 having rotary operation. The rotary switch 16 is mounted on a surface of the radio communications device 10, whilst the rotary selector portion 18 is incorporated into the base of the antenna portion 12, forming an antenna-switch configuration, whereby rotation of the antenna-switch configuration causes selective actuation of the rotary selector portion 18. Typically, the rotary selector portion 18 may be a switch having discrete positions that define a series of functions. However, the rotary selector portion 18 may alternatively be implemented as a rotary potentiometer. Furthermore, the rotary selector portion 18 may be suitably moulded in

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plastic, for example, to mimic the appearance of the conventional rotary switch 16.

In a preferred embodiment, this antenna-switch configuration is used to select an operating parameter for the radio communications device 10, e.g.

- 5 a current radio traffic channel. To this extent, the rotary selector 18 incorporated into the antenna 12, i.e. the portion for selecting a channel, is only operative when the antenna 12 is not transmitting radio frequency signals 14, although this need not be the case.

It will be appreciated that the radio frequency signals 14 may be of any
10 frequency and, consequentially, the invention has application in the fields of cellular, VHF and Personal Communication systems (PCN). Furthermore, in applications where the radio communications device 12 receives high frequency signals, e.g. greater than one gigahertz (1GHz), the overall dimensions of the antenna 12 are reduced and, as such, mean that the
15 antenna-switch configuration can be made more compact.

The antenna-switch of Fig. 1 is shown in greater detail in Fig. 2. A base 19 of the antenna portion 12 protrudes through a housing 20 of the radio communications device 10. A slip-ring 22, for example, is connected to the base of the antenna portion 12 and provides a mechanism for coupling a
20 radio frequency (RF) path 24 between the antenna portion 12 and a transceiver 26. The slip-ring ensures that the RF path is maintained during rotation of the antenna portion and consequential actuation of the rotary selector portion. It will be understood that the transceiver may be replaced by a receiver or a transmitter.

25 A rigid insulative rod selection is coupled between the base 19 of the antenna portion 12 and a rotary function (or position) selector 30 of the selector portion 18. The rotary function (or position) selector 30 is coupled to a microprocessor 32 and provides control signals 34 thereto. The microprocessor 32 is further coupled to the transceiver 26 for operational control thereof.
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An interface between the antenna 12 and the housing 20 will typically include grommets, washers and other sealing arrangements to ensure a water-tight seal therebetween.

35 Operation of the antenna-switch configuration is such: selected rotation of the antenna portion 12 causes rotation of the insulative rod, rotation of the rotary function (or position) selector 30 and hence selection of a different position of the rotary selector (switch). The microprocessor 32 in

response to, say, a change in input voltage resulting from the different position, generates a control signal 36 that alters an operating parameter, such a current operating channel for the transceiver 26.

With regard to Fig. 3, there is shown an alternative embodiment for the antenna-switch of the present invention. In order to limit rotation of a potentiometer-type, rotary switch to its typical arcuate operating range of ~220°, the base 19 of the antenna portion comprises a first gear wheel 37 which interacts with a second gear wheel 38 coupled to the insulative rod 28. Therefore, full rotation of the antenna portion 12 only results in partial or limited rotation of the rotary function (or position) selector 30.

Fig. 4 illustrates a further embodiment of the antenna-switch. In this instance, the antenna-switch is not only rotatable but also has a further doubling of switch positions provided by the longitudinal movement of the switch along an axis of the antenna portion 12 as realised by a pull-up, push-down configuration. More specifically, the base 19 of the antenna has two coupling rings 40 and 42 attached thereto. A rotary function (or position) selector 44 has two elements 46, 48 which are configured to engage the two coupling rings 40, 42 on a mutually exclusive basis, i.e. each element is paired with one of the two coupling rings and only one contact between an element and a coupling ring is made in each pull-up, push-down position. Alternatively, the coupling rings 40, 42 may be substituted for a mechanical switching arrangement, e.g. a microswitch, having discrete operating positions, whereby each discrete operating position determines functionality of the switching arrangement.

Operation of the pull-up, push-down arrangement may be limited to an extreme arc of rotation for the rotary switch 18. For example, if the antenna-switch configuration provides a channel selection from channels 1-20, channels 1-10 may be selected when the pull-up, push-down arrangement is depressed in a lower position. Only when the rotary switch 18 has been systematically rotated to the channel 10 position can the antenna 12 be "pulled-out" to an upper position whereby reverse rotation of the rotary switch 18 provides access to channels 11-20.

In general, selected movement of the antenna portion 12 causes relative movement in a function (or position) selector 30, 44 of a switch portion 18 and results in a change in an operating parameter, such a current operating channel for a transceiver 26 of the radio communications device 10, determined by the a new position of function (or position) selector 30.

It will be appreciated that an invention so designed and described produces the novel advantage of an ergonomically desirable switch, for a radio communications device, that is unobtrusive. Moreover, by incorporating a selector (switch) with an antenna, more space is made available on the radio communications device.

- 5 Furthermore, it will be understood that the above description has been given by way of example only and that modifications in detail, such as the independent implementation of the pull-up, push-down configuration, may be made within the scope of the invention. In addition, the pull-up,
10 push-down configuration may be implemented with several tiered operating positions at intermediate stages between full extension and retraction thereof.

Claims.

1. A selector for controlling an operating parameter of a radio communications device, the selector comprising:
 - 5 a) an antenna portion; and
 - b) a function selector portion, operatively coupled to the antenna portion, having a plurality of selectable operative positions; wherein selected movement of the antenna portion causes the function selector portion to move between an initial operative position and a new operative position with the result that the operating parameter of the radio communications device is changed.
- 10 2. A selector as claimed in claim 1, wherein the selector is a rotary switch having a rotary movement.
- 15 3. A selector as claimed in claim 2, further comprising a gearing mechanism, coupled between said antenna portion and said function selector portion, for limiting rotary movement of the function selector portion.
- 20 4. A selector as claimed in claim 1, 2 or 3, wherein the selector is a potentiometer.
- 25 5. A selector as claimed in any preceding claim, wherein the selector is a pull-up, push-down switch having longitudinal movement along an axis of the antenna portion.
- 30 6. A selector as claimed in any preceding claim, further comprising an insulative rod coupled between the function selector portion and the antenna portion for providing electrical isolation therebetween.
7. A selector as claimed in any preceding claim, wherein the selector is adapted to select an operating parameter reliant upon operation of the antenna portion.
- 35 8. A selector for a radio communications device substantially as described hereinabove with reference to the accompanying drawings.

Patents Act 1977

Examiner's report to the Comptroller under
Section 17 (The Search Report)

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Relevant Technical fields

- (i) UK CI (Edition L) F2Y(YTA); H3Q (QAA,QACA)
- (ii) Int CI (Edition 5) H01Q 1/22, 1/44; H04B 1/034, 1/24
1/50

Search Examiner

J L TWIN

Databases (see over)

- (i) UK Patent Office
- (ii) ONLINE DATABASE: WPI

Date of Search

19 MAY 1993

Documents considered relevant following a search in respect of claims

1-8

Category (see over)	Identity of document and relevant passages	Relevant to claim(s)
X	EP 0451623 A1 (NOKIA MOBILE PHONES)	1, 5, 7
X	US 4958382 (IMANISHI)	1, 5, 7



Category	Identity of document and relevant passages 8	Relevant to claim(s)

Categories of documents

X: Document indicating lack of novelty or of inventive step.

Y: Document indicating lack of inventive step if combined with one or more other documents of the same category.

A: Document indicating technological background and/or state of the art.

P: Document published on or after the declared priority date but before the filing date of the present application.

E: Patent document published on or after, but with priority date earlier than, the filing date of the present application.

&: Member of the same patent family, corresponding document.

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